LISTING OF CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) An encoding device comprising:

two-dimensional Haar wavelet transforming means for dividing an image into a plurality of subbands ~~extracting, as a signal block, signals of 2m × 2m (m being an integer; m = 1) spatially adjacent elements in a scan line order from an LL subband of a same hierarchy of an image or wavelet to perform a two-dimensional Haar wavelet transform to the signal block~~;

coefficient extracting means for extracting m (m being an integer; m≥1) sets of AC coefficients from m spatial coordinates of a same hierarchy subbands in a scan line order as ~~, whenever said two-dimensional Haar wavelet transforming means performs the two-dimensional Haar wavelet transform, extracting, as coefficient sets, LH, HL and HH coefficients belonging to same spatial coordinates from coefficients obtained by the two-dimensional Harr wavelet transform, thereby outputting~~ m coefficient sets;

coefficient encoding means for encoding the m coefficient sets to obtain codes, and concatenating the codes in the scan line order in the same hierarchy to generate a code sequence of a high-frequency subband ~~whenever the coefficient extracting means outputs the m coefficient sets~~;

initial coefficient encoding means for encoding and concatenating a DC component as a lowest-frequency subband to generate a code sequence of the lowest-frequency subband; and

code output means for outputting the code sequence of the lowest-frequency subband, and outputting, from a low-frequency to a high-frequency ~~hierarchal order~~, the code sequence of the high-frequency subband generated by said coefficient encoding means,

wherein each coefficient set consists of an LH, an HL and an HH coefficient belonging to a same spatial coordinate of same hierarchy subbands, the coefficient encoding means sequentially encodes current m coefficient sets at the same time before the coefficient extracting means extracts the next m coefficient sets belonging to the next m spatial coordinates of the same hierarchy subbands in the scan line order.

2. (Canceled)

3. (Original) An encoding device according to claim 1, characterized in that said coefficient extracting means sequentially extracts coefficient sets one by one.

4. (Currently Amended) An encoding device ~~characterized by~~ comprising:

~~element extracting means for sequentially extracting $2m \times 2$ (m is an integer; $m \geq 1$) spatially adjacent elements from a two-dimensional signal;~~

two-dimensional Haar wavelet transforming means for ~~dividing the~~ extracting, as signal blocks, signals of $2m \times 2$ (m is an integer; $m \geq 1$) spatially adjacent elements in a scan line order from an image or an LL subband of a same hierarchy of a wavelet to perform a two dimensional Haar wavelet transform to the signal block ~~into a plurality of subband coefficient sets~~;

coefficient extracting ~~encoding~~ means, extracting LH, HL and HH coefficients belonging to same spatial coordinates from coefficients obtained by the two-dimensional Haar wavelet transform as coefficient sets, thereby outputting m coefficient sets whenever said two-dimensional Haar wavelet transforming means is performed ~~for encoding and concatenating the AC component coefficient sets obtained by transform by said two-dimensional Haar wavelet transforming means, and generating a code sequence of a high-frequency subband~~;

coefficient encoding means for encoding the m coefficient sets to obtain codes, and concatenating the codes in the scan line order in the same hierarachy to generate a code sequence of a high-frequency subband whenever the coefficient extracting means outputs the m coefficient sets;

initial coefficient encoding means for encoding and concatenating a DC component as a lowest-frequency subband~~, and generating the~~ to generate a code sequence of the lowest-frequency subband; and

code output means for outputting the code sequence of the lowest-frequency subband, and ~~sequentially~~ outputting, from a low frequency to a high frequency, the code sequence of the high-frequency subband generated by said coefficient encoding means,

wherein each coefficient set consists of an LH, an HL and an HH coefficient belonging to a same spatial coordinate of same hierarchy subbands, the coefficient encoding means sequentially encodes current m coefficient sets at the same time before the coefficient extracting means extracts the next m coefficient sets belonging to the next m spatial coordinates of the same hierarchy subbands in the scan line order.

5. (Previously Presented) An encoding device according to claim 1, characterized in that each coefficient comprises a plurality of components, and said coefficient encoding means encodes each component of a coefficient, and generates a code by concatenating a code of each component.

6. (Previously Presented) An encoding device according to claim 4, characterized in that each coefficient comprises a plurality of components, and said coefficient encoding means encodes each component of a coefficient, and generates a code by concatenating a code of each component.

7. (Previously Presented) An encoding device according to claim 1, characterized in that each coefficient comprises a plurality of components, and said coefficient encoding means encodes each component of a coefficient, and generates a code by concatenating a code of each coefficient.

8. (Previously Presented) An encoding device according to claim 4, characterized in that each coefficient comprises a plurality of components, and said coefficient encoding means encodes each component of a coefficient, and generates a code by concatenating a code of each coefficient.

9 – 21 (Cancelled)

22. (Withdrawn) An encoding device according to claim 1, characterized by further comprising coefficient thinning map generating means for generating a coefficient thinning map in which resolution at each spatial coordinate of the two-dimensional signal is set, and

updated region detecting means for detecting a updated region from a plurality of sequential frames of a sequence of a plurality of frames forming the two-dimensional signal, and obtaining a changing period during which a signal value changes in each partial region from said plurality of sequential frames,

wherein said coefficient thinning map generating means sets the resolution on the basis of the changing period, and generates a coefficient thinning map in which resolution of the updated region differs from resolution of a region other than the updated region, and

said coefficient extracting means refers to the coefficient thinning map, and extracts coefficients by thinning the coefficients to the resolution set for the coordinate.

23. (Withdrawn) An encoding device according to claim 4, characterized by further comprising

coefficient thinning map generating means for generating a coefficient thinning map in which resolution at each spatial coordinate of the two-dimensional signal is set, and

updated region detecting means for detecting a updated region from a plurality of sequential frames of a sequence of a plurality of frames forming the two-dimensional signal, and obtaining a changing period during which a signal value changes in each partial region from said plurality of sequential frames,

wherein said coefficient thinning map generating means sets the resolution on the basis of the changing period, and generates a coefficient thinning map in which resolution of the updated region differs from resolution of a region other than the updated region, and

said element extracting means refers to the coefficient thinning map, and extracts coefficients by thinning the coefficients to the resolution set for the coordinate.

24. (Withdrawn) An encoding device according to claim 22, characterized in that said coefficient thinning map generating means sets low resolution in a region in which the changing period is long.

25. (Withdrawn) An encoding device according to claim 23, characterized in that said coefficient thinning map generating means sets low resolution in a region in which the changing period is long.

26 – 37 (Cancelled)

38. (Withdrawn) An encoding device according to claim 1, characterized by further comprising

coefficient quantization map generating means for generating a coefficient quantization map in which quantization accuracy at each spatial coordinate of the two-dimensional signal is set,

coefficient quantizing means for quantizing a coefficient to quantization accuracy corresponding to a spatial coordinate of the coefficient by referring to the coefficient quantization map, and

updated region detecting means for detecting a updated region from a plurality of sequential frames of a sequence of a plurality of frames forming the two-dimensional signal, and obtaining a changing period during which a signal value changes in each partial region from said plurality of sequential frames,

wherein said coefficient quantization map generating means sets the quantization accuracy on the basis of the changing period, and generates a coefficient quantization map in which quantization accuracy of the updated region differs from resolution of a region other than the updated region, and

said coefficient encoding means encodes a set of the quantized coefficients.

39. (Withdrawn) An encoding device according to claim 4, characterized by further comprising

coefficient quantization map generating means for generating a coefficient quantization map in which quantization accuracy corresponding to each spatial coordinate of the two-dimensional signal is set,

coefficient quantizing means for quantizing a coefficient set to quantization accuracy corresponding to a spatial coordinate of the coefficient set by referring to the coefficient quantization map, and

updated region detecting means for detecting a updated region from a plurality of sequential frames of a sequence of a plurality of frames forming the two-dimensional signal, and obtaining a changing period during which a signal value changes in each partial region from said plurality of sequential frames,

wherein said coefficient quantization map generating means sets the quantization accuracy on the basis of the changing period, and generates a coefficient quantization map in which quantization accuracy of the updated region differs from resolution of a region other than the updated region, and

said coefficient encoding means encodes a set of the quantized coefficients.

40. (Withdrawn) An encoding device according to claim 38, characterized in that said coefficient thinning map generating means sets low quantization accuracy in a region in which the changing period is long.

41. (Withdrawn) An encoding device according to claim 39, characterized in that said coefficient thinning map generating means sets low quantization accuracy in a region in which the changing period is long.

42 – 45 (Cancelled)

46. (Withdrawn) An encoding device according to claim 1, characterized by further comprising

coefficient thinning map generating means for generating a coefficient thinning map in which resolution at each spatial coordinate of the two-dimensional signal is set, and

updated region detecting means for detecting, as a updated region, an overlapping region of a region to be encoded of a preceding frame and a region to be encoded of a succeeding frame of a sequence of a plurality of frames forming the two-dimensional signal,

wherein said coefficient thinning map generating means generates a coefficient thinning map in which resolution of the updated region differs from resolution of a region other than the updated region, and

said coefficient extracting means refers to the coefficient thinning map, and extracts coefficients by thinning the coefficients to the resolution set for the coordinate.

47. (Withdrawn) An encoding device according to claim 4, characterized by further comprising

coefficient thinning map generating means for generating a coefficient thinning map in which resolution at each spatial coordinate of the two-dimensional signal is set, and

updated region detecting means for detecting, as a updated region, an overlapping region of a region to be encoded of a preceding frame and a region to be encoded of a succeeding frame of a sequence of a plurality of frames forming the two-dimensional signal,

wherein said coefficient thinning map generating means generates a coefficient thinning map in which resolution of the updated region differs from resolution of a region other than the updated region, and

said element extracting means refers to the coefficient thinning map, and extracts coefficients by thinning the coefficients to the resolution set for the coordinate.

48. (Withdrawn) An encoding device according to claim 1, characterized by further comprising

coefficient quantization map generating means for generating a coefficient quantization map which represents quantization accuracy at each spatial coordinate of the two-dimensional signal, coefficient quantizing means for quantizing coefficients to quantization accuracy corresponding to each spatial coordinate of the coordinates with reference to the coefficient quantization map, and

updated region detecting means for detecting, as a updated region, an overlapping region of a region to be encoded of a preceding frame and a region to be encoded of a succeeding frame of a sequence of a plurality of frames forming the two-dimensional signal,

wherein said coefficient thinning map generating means generates a coefficient quantization map in which quantization accuracy of the updated region differs from quantization accuracy of a region other than the updated region, and

said coefficient encoding means encodes a set of the quantized coefficients.

49. (Withdrawn) An encoding device according to claim 4, characterized by further comprising

coefficient quantization map generating means for generating a coefficient quantization map in which quantization accuracy corresponding to each spatial coordinate of the two-dimensional signal is set,

coefficient quantizing means for quantizing a coefficient set to quantization accuracy corresponding to a spatial coordinate of the coefficient set by referring to the coefficient quantization map, and

updated region detecting means for detecting, as a updated region, an overlapping region of a region to be encoded of a preceding frame and a region to be encoded of a succeeding frame of a sequence of a plurality of frames forming the two-dimensional signal,

wherein said coefficient quantization map generating means generates a coefficient quantization map in which quantization accuracy of the updated region differs from quantization accuracy of a region other than the updated region, and

said coefficient encoding means encodes a set of the quantized coefficients.

50. (Currently Amended) A decoding device comprising:

initial coefficient decoding means for receiving a code sequence of a plurality of subband coefficients obtained by two-dimensional Haar wavelet transform of N hierarchies (N being an integer: $N \geq 1$ ~~$N = 1$~~), and decoding LL subband coefficients of an Nth hierarchy from the code sequence for all spatial coordinates;

coefficient decoding means for decoding an LL subband of an nth hierarchy (n being an integer: ~~$1 = n = N$~~ $1 \leq n \leq N$) for all spatial coordinates, sequentially receiving a code sequence corresponding to LH, HL and HH coefficients of an (n-1)th hierarchy, performing a decoding operation every m sets (m being an integer: $m \geq 1$ ~~$m = 1$~~) of the LH, HL and HH coefficients of the (n-1)th hierarchy at a spatially same position in a scan line order, and repeating the decoding operation until all spatial coordinates of the (n-1)th hierarchy are decoded; and

inverse wavelet transforming means for performing two-dimensional Haar inverse wavelet transform using the decoded LH, HL and HH coefficients of the m sets and the LL subband coefficients of the nth hierarchy at the same spatial coordinates, thereby generating an original image serving as the LL subband of the (n-1)th hierarchy or an LL subband of a 0^{th} hierarchy immediately after ~~whenever~~ the coefficient sets of the m sets are decoded.

51. (Original) A decoding device according to claim 50, characterized in that said coefficient decoding means sequentially decodes a predetermined number of coefficient sets at a time in a scan line direction of the two-dimensional signal.

52. (Original) A decoding device according to claim 51, characterized in that said coefficient decoding means sequentially decodes the coefficient sets one by one.

53. (Previously Presented) A decoding device according to claim 52, characterized in that each coefficient comprises a plurality of components, and said coefficient decoding means decodes each component of a coefficient, and concatenates each component.

54. (Original) A decoding device according to claim 52, characterized in that each coefficient comprises a plurality of components, and said coefficient decoding means decodes each component of a coefficient.

55 – 73 (Cancelled)

74. (Currently Amended) An encoding program embodied on a non-transitory computer-readable medium for causing a computer to execute the steps of:

dividing an image into a plurality of subbands ~~extracting, as a signal block, signals of 2m × 2m (m being an integer: m = 1) spatially adjacent elements in a scan line order from an LL subband of a same hierarchy of an image or wavelet to perform a two-dimensional Haar wavelet transform to the signal block~~;

encoding and concatenating a DC component as a lowest-frequency subband to generate a code sequence of the lowest-frequency subband;

extracting m (m being an integer; $m \geq 1$) sets of AC coefficient from m spatial coordinates of same hierarchy subbands in a scan line order [[,]] as m coefficient sets~~, LH, HL and HH coefficients belonging to same spatial coordinates from coefficients obtained by the two-dimensional Harr wavelet transform, thereby outputting m coefficient sets, whenever said two-dimensional Haar wavelet transform is performed~~;

encoding the m coefficient sets to obtain codes, and concatenating the codes in the scan line order in the same hierarchy to generate a code sequence of a high-frequency subband ~~whenever the coefficient extracting means outputs the m coefficient sets~~; and

outputting the code sequence of the lowest-frequency subband, and outputting, from a low-frequency to a high-frequency ~~hierarchal order~~, the code sequence of the high-frequency subband.

wherein each coefficient set consists of an LH, an HL and an HH coefficient belonging to a same spatial coordinates of same hierarchy subbands, the coefficient encoding step sequentially encodes current m coefficient sets at the same time before the extracting step extracts the next m coefficient sets belonging to the next m spatial coordinates of the same hierarchy subbands in the scan line order.

75. (Currently Amended) An encoding program embodied on a non-transitory computer-readable medium for causing a computer to execute the steps of:

sequentially extracting $2m \times 2$ (m is an integer: $m \geq 1$) spatially adjacent elements in a scan line order from an image or an LL subband of a same hierarchy of a wavelet as a signal block to perform a two dimensional Haar wavelet transform to the signal block ~~a two-dimensional signal~~;

~~dividing the 2m × 2 elements into a plurality of subband coefficient sets by two-dimensional Haar wavelet transform;~~

extracting LH, HL and HH coefficients belonging to same spatial coordinates from coefficients obtained by the two-dimensional Haar wavelet transform as coefficient sets, thereby outputting m coefficient sets whenever said two-dimensional Haar wavelet transforming means is performed ~~encoding and concatenating the AC component coefficient sets obtained by two-dimensional Haar wavelet transform, and generating a code sequence of a high frequency subband~~;

encoding and concatenating a DC component as a lowest-frequency subband~~, and generating the~~ to generate a code sequence of the lowest-frequency subband;

encoding the m coefficient sets to obtain codes, and concatenating the codes in the scan line order in the same hierarchy to generate a code sequence of a high-frequency subband whenever the coefficient extracting means outputs the m coefficient sets; and

outputting the code sequence of the lowest-frequency subband, and ~~sequentially~~ outputting, from low frequency to high frequency, the code sequence of the high-frequency subband,

wherein each coefficient set consists of an LH, an HL and an HH coefficient belonging to a same spatial coordinate of same hierarchy subbands, the coefficient encoding step sequentially encodes current m coefficient sets at the same time before the extracting step extracts the next m coefficient sets belonging to the next m spatial coordinates of the same hierarchy subbands in the scan line order.

76 –83 (Cancelled)

84. (Currently Amended) A decoding program embodied on a non-transitory computer-readable medium for causing a computer to execute the steps of:

receiving a code sequence of a plurality of subband coefficients obtained by two-dimensional Haar wavelet transform of N hierarchies (N being an integer: $N \geq 1$ ~~$N = 1$~~);

decoding LL subband coefficients of an Nth hierarchy from the code sequence for all spatial coordinates;

decoding an LL subband of an nth hierarchy (n being an integer: ~~1 = n = N~~ 1 ≤ n ≤ N) for all spatial coordinates, sequentially receiving a code sequence corresponding to LH, HL and HH coefficients of an (n-1)th hierarchy, performing a decoding operation every m sets (m being an integer: m ≥ 1 ~~m = 1~~) of the LH, HL and HH coefficients of the (n-1)th hierarchy at a spatially same position in a scan line order, and repeating the decoding operation until all spatial coordinates of the (n-1)th hierarchy are decoded; and

performing two-dimensional Haar inverse wavelet transform using the decoded LH, HL and HH coefficients of the m sets and the LL subband coefficients of the nth hierarchy at the same spatial coordinates, thereby generating an original image serving as the LL subband of the (n-1)th hierarchy or an LL subband of a 0^{th} hierarchy immediately after ~~whenever~~ the coefficient sets of the m sets are decoded.

85. (Currently Amended) A communication terminal characterized by comprising:

image input means;

communicating means for transmitting and receiving an encoded image signal;

two-dimensional Haar wavelet transforming means for dividing an image into a plurality of subbands ~~extracting, as a signal block, signals of 2m × 2m (m being an integer: m = 1) spatially adjacent elements in a scan line order from an LL subband of a same hierarchy of an image or wavelet to perform a two-dimensional Haar wavelet transform to the signal block~~;

coefficient extracting means for extracting m (m being an integer: m≥1) sets of AC coefficients from m spatial coordinates of a same hierarchy subbands in a scan line order as ~~, whenever said two-dimensional Haar wavelet transforming means performs the two-dimensional Haar wavelet transform, extracting, as coefficient sets, LH, HL and HH coefficients belonging to~~

~~same spatial coordinates from coefficients obtained by the two-dimensional Harr wavelet transform, thereby outputting~~ m coefficient sets;

coefficient encoding means for encoding the m coefficient sets to obtain codes, and concatenating the codes in the scan line order in the same hierarchy to generate a code sequence of a high-frequency subband ~~whenever the coefficient extracting means outputs the m coefficient sets~~;

initial coefficient encoding means for encoding and concatenating a DC component as a lowest-frequency subband to generate a code sequence of the lowest-frequency subband;

code output means for outputting the code sequence of the lowest-frequency subband to said communication means, and outputting, from a low-frequency to a high-frequency ~~hierarchal order~~, the code sequence of the high-frequency subband generated by said coefficient encoding means to said communication means,

wherein each coefficient set consists of an LH, an HL and an HH coefficient belonging to a same spatial coordinate of same hierarchy subbands, the coefficient encoding means sequentially encodes current m coefficient sets at the same time before the coefficient extracting means extracts the next m coefficient sets belonging to the next m spatial coordinates of the same hierarchy subbands in the scan line order;

initial coefficient decoding means for receiving a code sequence of a plurality of subband coefficients obtained by two-dimensional Haar wavelet transform of N hierarchies (N being an integer: $N \geq 1$ ~~$N = 1$~~), and decoding LL subband coefficients of an Nth hierarchy from the code sequence for all spatial coordinates;

coefficient decoding means for decoding an LL subband of an nth hierarchy (n being an integer: ~~1 = n = N~~ $1 \leq n \leq N$) for all spatial coordinates, sequentially receiving a code sequence corresponding to LH, HL and HH coefficients of an (n-1)th hierarchy, performing a decoding operation every m sets (m being an integer: $m \geq 1$ ~~m = 1~~) of the LH, HL and HH coefficients of the (n-1)th hierarchy at a spatially same position in a scan line order, and repeating the decoding operation until all spatial coordinates of the (n-1)th hierarchy are decoded;

inverse wavelet transforming means for performing two-dimensional Haar inverse wavelet transform using the decoded LH, HL and HH coefficients of the m sets and the LL subband coefficients of the nth hierarchy at the same spatial coordinates, thereby generating an original image serving as the LL subband of the (n-1)th hierarchy or an LL subband of a 0^{th} hierarchy immediately after ~~whenever~~ the coefficient sets of the m sets are decoded; and

image display means for displaying a received image on the basis of the received image signal.